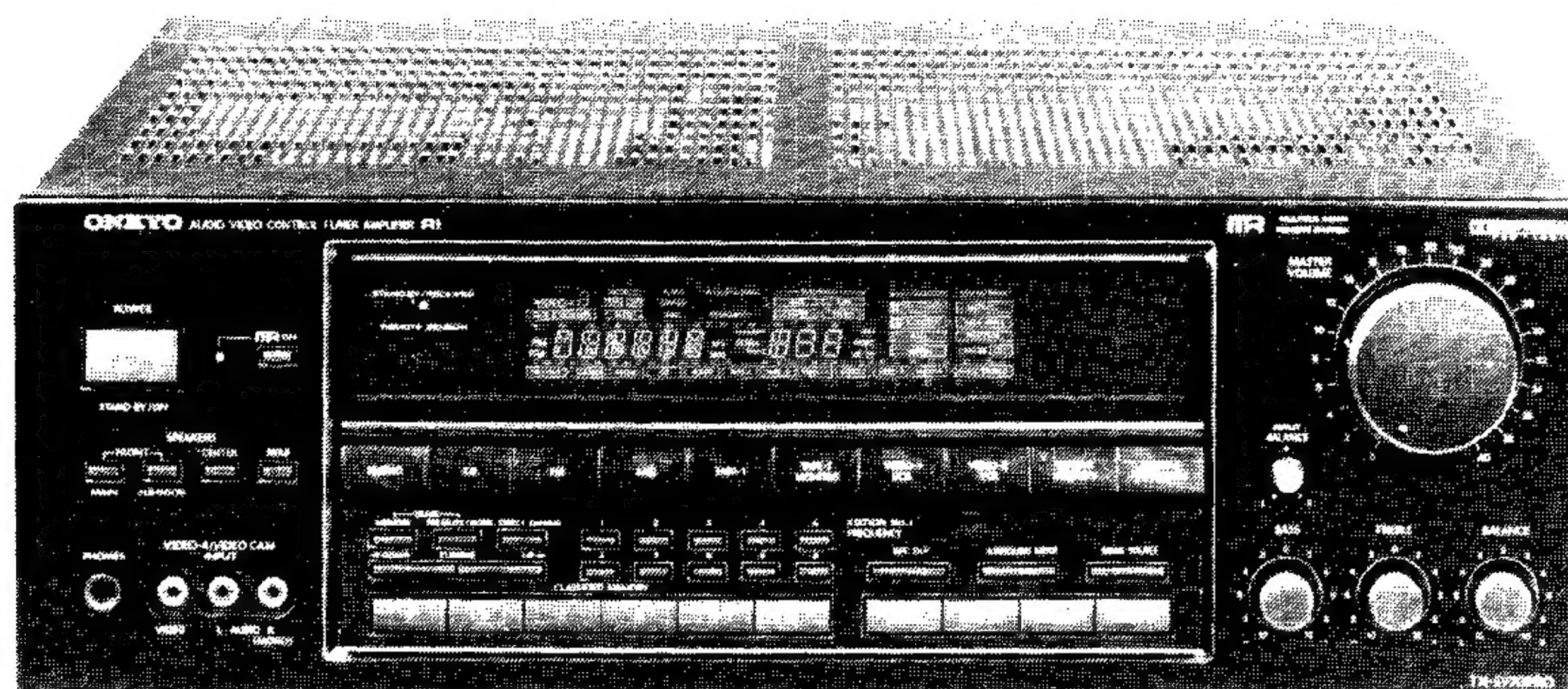



# ONKYO® SERVICE MANUAL

## AUDIO VIDEO CONTROL TUNER AMPLIFIER MODEL TX-SV70PRO



### SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK  ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PARTS NUMBERS APPEAR AS SHOWN IN THIS MANUAL.

MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

**ONKYO**  
**AUDIO COMPONENTS**

# SPECIFICATIONS

## AMPLIFIER SECTION

Power Output:	Stereo mode 90 watts per channel min. RMS. at 8 ohms, both channels driven, from 20Hz to 20,000Hz, with no more than 0.06% total harmonic distortion. Surround mode 85 watts per channel min. RMS. at 8 ohms both channels driven, from 20Hz to 20,000Hz, with no more than 0.06% total harmonic distortion. (FRONT/CENTER Matrix surround mode) 30 watts per channel min. RMS. at 8 ohms 1,000Hz with no more than 0.08% total harmonic distortion. (REAR Matrix surround mode)
Total Harmonic Distortion:	0.06% at rated power (FRONT)
IM distortion:	0.06% at rated power (FRONT)
Damping Factor:	70 at 8 ohms (FRONT)
Sensitivity and Impedance:	Phono: 2.5mV/50 kohms CD/Tape Play: 150mV/50 kohms Tape Rec: 150mV/2.2 kohms (Phono) Pre out (FRONT): 1V, 2.2 kohms Pre out (REAR/CENTER): 1V, 2.2 kohms Mono out (SUB WOOFER): 1V, 2.2 kohms
Phono Overload:	120mV RMS. at 1,000 Hz, 0.06% THD.
Frequency Response:	20 to 30,000 Hz, $\pm 1$ dB VIDEO IN $\rightarrow$ DOLBY PRO LOGIC $\rightarrow$ SURROUND $\rightarrow$ REAR PRE OUT: 30 to 7 kHz, $\pm 0$ dB, $\pm 3$ dB
RIAA Deviation:	20 to 20,000 Hz, $\pm 0.8$ dB
Tone Control:	BASS: $\pm 10$ dB at 100 Hz TREBLE: $\pm 10$ dB at 10,000 Hz
Signal to Noise Ratio:	PHONO: 80 dB (IHF A, 5mV input) CD/TAPE: 100 dB (IHF A)
Muting:	$-\infty$

## TUNER SECTION

<b>FM:</b>	
Tuning Range:	87.50 – 108.00 MHz (50 kHz steps)
Usable Sensitivity:	Mono: 11.2 dBf, 2.0 $\mu$ V Stereo: 17.2 dBf, 4.0 $\mu$ V
50dB Quieting Sensitivity:	Mono: 17.2 dBf, 4.0 $\mu$ V Stereo: 37.2 dBf, 40 $\mu$ V
Capture Ratio:	1.5 dB
Image Rejection Ratio:	40 dB
IF Rejection Ratio:	90 dB
Signal-to-Noise Ratio:	Mono: 76 dB Stereo: 70 dB
Alternate Channel Attenuation:	55 dB
AM suppression Ratio:	50 dB
Harmonic Distortion:	Mono: 0.1% Stereo: 0.2%
Frequency Response:	30 – 15,000 Hz $\pm 1.0$ dB
Stereo Separation:	45 dB at 1kHz 30 dB at 100 – 10,000Hz
Muting Level:	17.2 dBf
<b>AM:</b>	
Tuning Range:	530 – 1710 kHz (10 kHz steps)
Usable Sensitivity:	30 $\mu$ V
Image Rejection Ratio:	40 dB
IF Rejection Ratio:	40 dB
Signal-to-Noise Ratio:	40 dB
Harmonic Distortion:	0.7%

## GENERAL

Power Supply:	AC120V, 60Hz
Dimensions (W×H×D):	435×157×432 mm 17-1/8"×6-3/16"×17"
Weight:	14.0kg., 30.9 lbs.

## REMOTE CONTROL TRANSMITTER RC-AV70M

Transmitter:	Infrared
Signal Range:	Approx. 5 meters (16ft. 4")
Power Supply:	Two "AA" batteries (1.5V×2)

Specifications and features are subject to change without notice.

## SERVICE PROCEDURES

### 1. Replacing the fuses

For continued protection against fire hazard, replace only with same type and same rating fuse.

Circuit No.	Part No.	Description
F901	252053	8A (ST-6), Primary
F903, F904	252051	6A (ST-6), Secondary

### 2. Change of AM band selector

A AM BAND step selector switch is not provided.

Band step	D716 (ISS133)
10kHz → 9kHz	Additional
9kHz → 10kHz	Eliminated

The diode D716 is on the display PC board. (Refer to the page 23)

### 3. Memory preservation

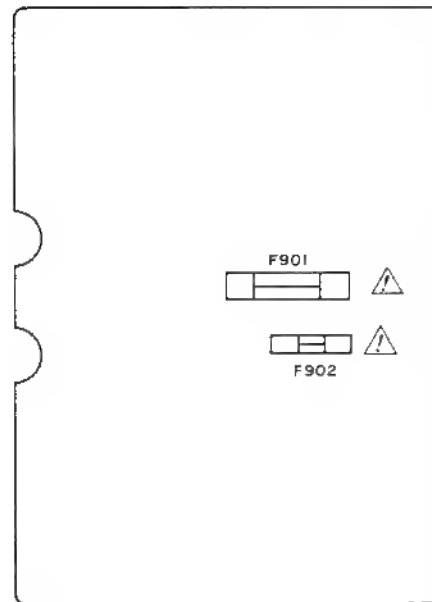
This unit does not require memory preservation batteries. A built-in memory power back-up system preserves contents of the memory during power failures and even when the unit is unplugged. The unit must be plugged in and the power switch turned on and off once in order to charge the back-up system. Note that since this is not a permanent memory the power switch must be turned on and off a few times each month to keep the back-up system operative. The period of time during which memory contents are preserved after power has last been turned off varies depending on climate and placement of the unit. On the average, memory contents are protected over a period of 3 to 4 weeks (a minimum of 2 weeks) after the last time power has been turned off. This period is shorter when the unit is exposed to very high humidity or used in an area with an extremely humid climate.

### 4. Safety-check out

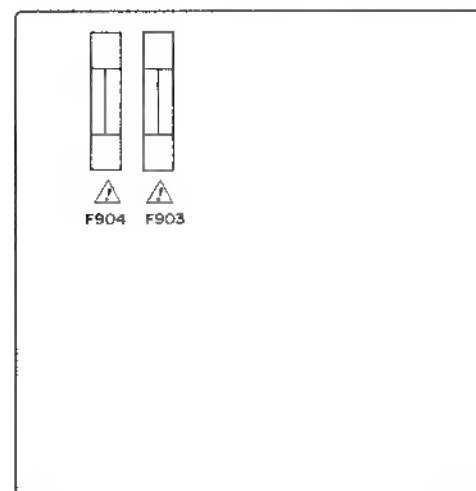
(Only U.S.A. model)

After correcting the original service problem perform the following safety check before releasing the set to the customer.

Connect the insulating-resistance tester between the plug of power supply cord and terminal GND on the back panel. Specifications: 3.3 Mohm  $\pm$ 10% at 500V.

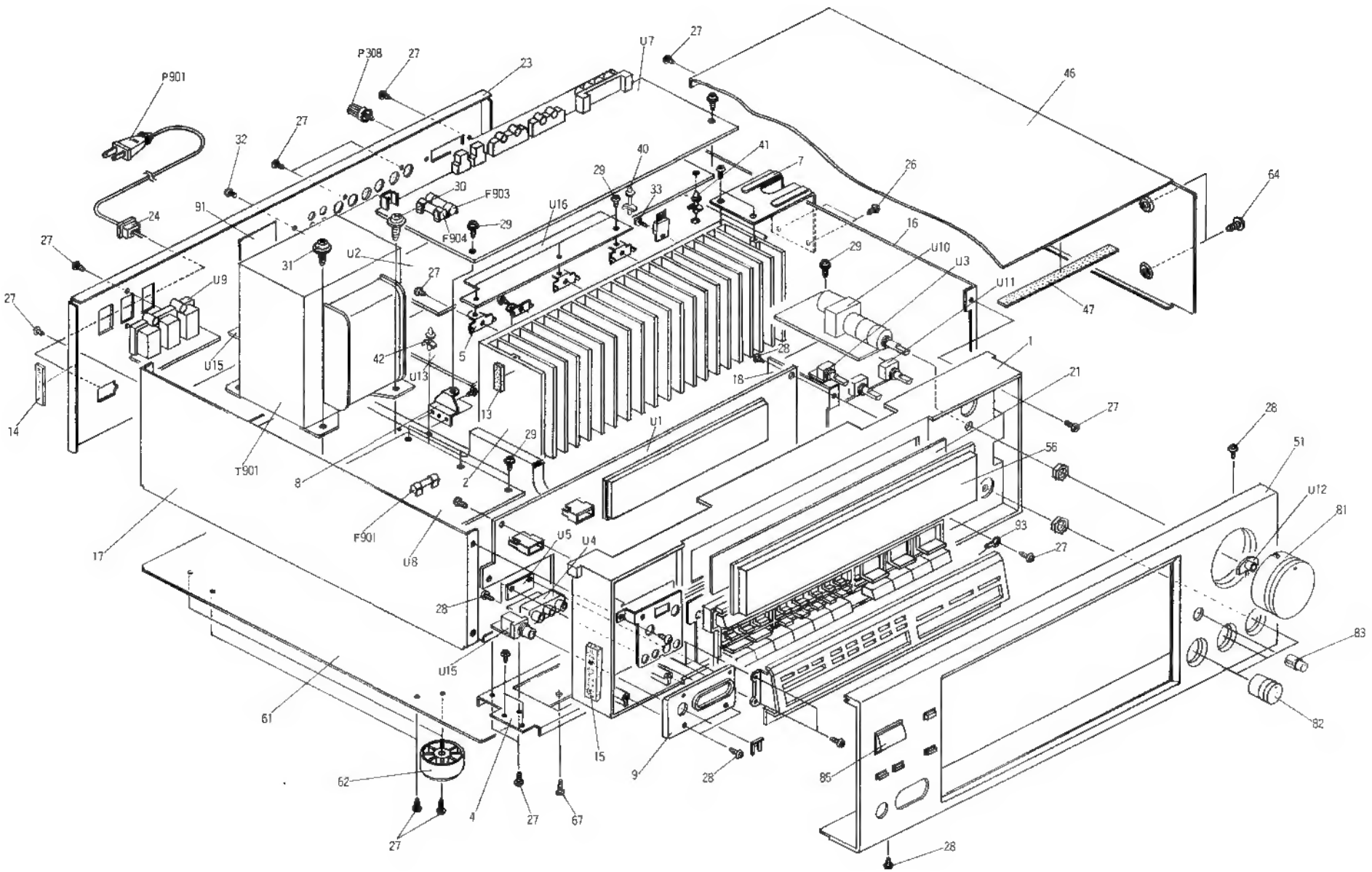


Power supply circuit pc board



Tuner circuit pc board

# CHASSIS-EXPLODED VIEW



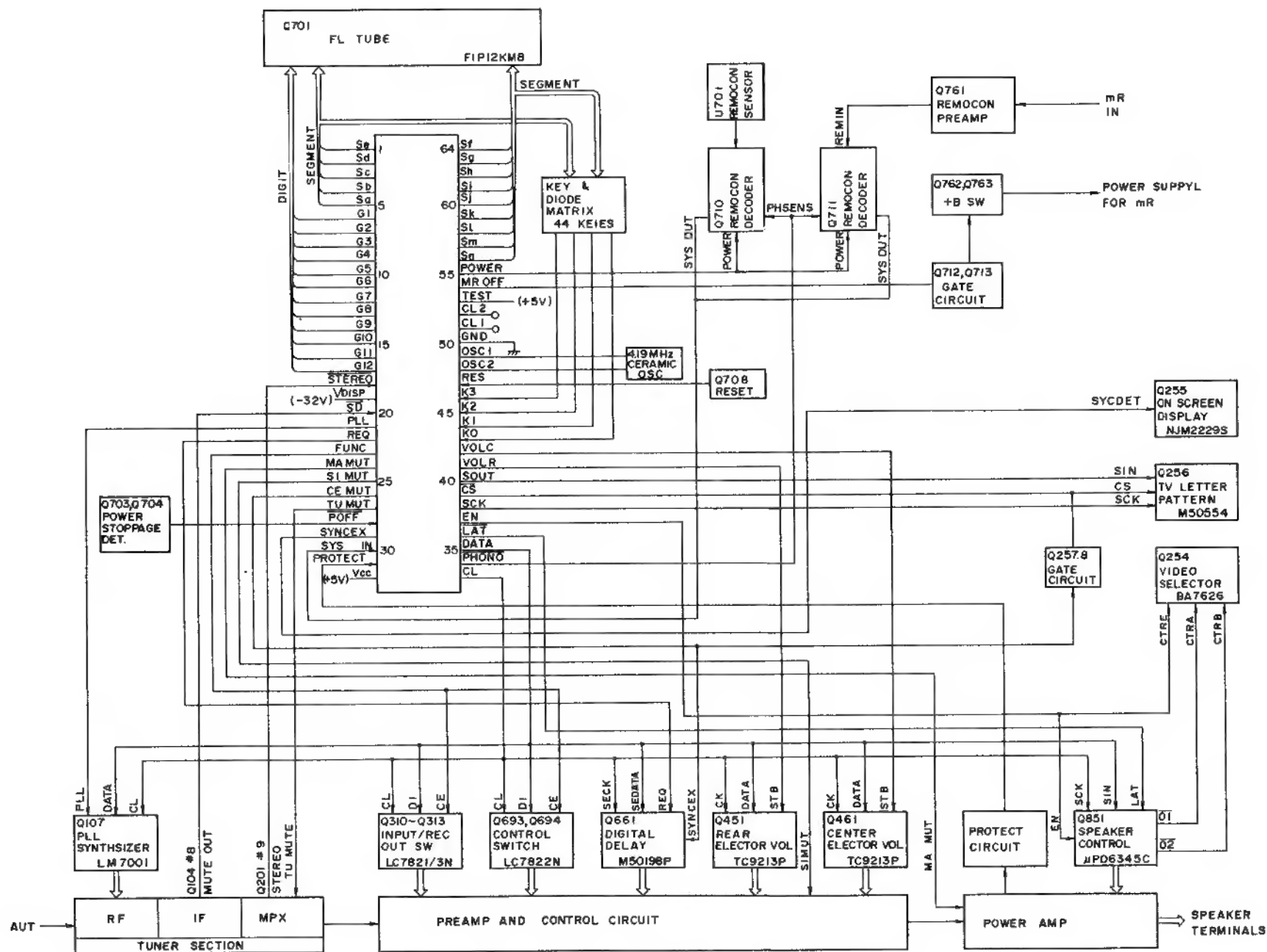
# CHASSIS-EXPLODED VIEW – PARTS LIST

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
1	27110585A	Front bracket	F901	252053	▲ 8A (ST-6), Primary fuse
2	27160261	Radiator	F903, F904	252051	▲ 6A (ST-6), Secondary fuse
4	27130628	Bracket H	P308	25060044	Terminal GND
5	27141359	Bracket H	P901	253123,	
7	27141322	Bracket R		253136,	
8	27141360	Bracket B		253140,	
9	27190782	Holder PIN		253146 or	
13	28140927	12×30×10, Cushion		253161	▲ AS-UC6#18, Power supply cord
14	28140933	13× 7×55, Cushion	T 901	2300589	▲ NPT-1080D, Power transformer
15	28141086	Cushion	U1	1A233565-1	NADIS-3965-1, Display circuit
16	27115240-1	Side bracket			pc board ass'y
17	27130564D	Bracket PT	U2	1A233566-1	NAAF-3966-1, Surround circuit
18	27130621	Bracket F			pc board ass'y
21	28133248	Back plate	U3	1A233567-1	NAETC-3967-1, Input balance
23	27121377A	Back panel			volume pc board ass'y
24	27300750	▲ Bushing	U4	1A233568-1	NAETC-3968-1, Video terminal
27	834430088	3TTS+8B (BC), Self-tapping screw			pc board ass'y
28	833430080	3TTP+8P (BC), Self-tapping screw	U5	1A233569-1	NAETC-3969-1, Pc board for video
29	831130088	3TTW+8B, Self-tapping screw			pc board hold
30	830440089	4TTC+8C (BC), Self-tapping screw	U7	1A233570-1	NARF-3970-1, Tuner circuit
31	838440109	4TTB+ 10C (BC), Self-tapping screw			pc board ass'y
32	82143006	3P+6FN (BC), Pan head screw	U8	1A233571-1	NAPS-3971-1, Power supply circuit
33	801433	3SMS8W-SW+14B (BC), Sems self-tapping screw	U9	1A233572-1	NAETC-3972-1, AC outlet terminal
40	27190369	KGLS-22S, Holder			pc board ass'y
41	27190783	KGLS-11S, Holder	U10	1A233573-1	NAAF-3973-1, Master volume
42	27190693	KGLS-6R, Holder			pc board ass'y
46	28184463A	Top cover	U11	1A233574-1	NAAF-3974-1, Tone control
47	28140835	t0.5×10×135, Cushion			pc board ass'y
51	1A233121	Front panel ass'y	U12	1A233575-1	NADIS-3975-1, Volume indicator
56	28191576	Clear plate			pc board ass'y
61	27170254C	Bottom board	U13	1A233576-1	NAAF-3976-1, Pre., and main amplifier pc board ass'y
62	27175153-1	Leg			NAETC-3977-1, Speaker terminal
64	838440089	4TTB+8C (BC), Self-tapping screw	U14	1A233577-1	
67	834430108	3TTS+10B (BC), Self-tapping screw			pc board ass'y
81	28323558	Knob VOLUME	U15	1A233578-1	NAETC-3978-1, Headphone
82	28323310A	Knob TONE			terminal pc board ass'y
83	28323671A	Knob VOLUME	U16	1A233579-1	NAAF-3979-1, Rear
85	28324072	Knob POWER			amplifier pc board ass'y
91	29360626-1	Label FUSE			
92	260215	Binder			
93	2061112060	Terminal ass'y			

NOTE:  
THE COMPONENTS IDENTIFIED BY MARK ▲ ARE  
CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK.  
REPLACE ONLY WITH PARTS NUMBER SPECIFIED.



## MICROPROCESSOR DESCRIPTIONS



**Q702**  
**HD404729A86 (Microprocessor)**  
**Terminal Description**

Pin no.	Symbol	Description
1	Se	Segment output terminals.Active H.
2	Sd	
3	Sc	
4	Sb	
5	Sa	Digit and Key scan output terminals.Active H.
6	G1	
7	G2	
8	G3	
9	G4	
10	G5	
11	G6	
12	G7	
13	G8	
14	G9	
15	G10	
16	G11	
17	G12	
18	STEREO	Stereo broadcast discrimination input terminal.Active L. Control to the indicator STEREO.
19	Vdisp	Power supply terminal for pull-down resistor.
20	SD	Broadcast discrimination input terminal.Active L.
21	PLL	Connect to the terminal CE of PLL IC (LM7001). Active H.
22	REQ	Connect to the terminal REQ of delay IC(M50198P).Active H.
23	FUNC	Connect to the terminal CE of analog switches.(LC7821N, LC7822N and LC7823N) Active H.
24	MAMUT	Audio main muting output terminal.Active H.
25	SIMUT	Audio simulative muting output terminal.Active H.
26	CEMUT	Muting output terminal for the chip select terminal of the control ICs(Data extended IC,PLL IC,and Delay IC).Active H.
27	TUMUT	Tuner muting output terminal.Active H.
28	POFF	Stoppage detection input terminal.Active L.
29	SYNCEX	External/Internal changeover input terminal of synchronizing signal of on screen display.
30	SYS IN	System code input terminal.Active H.
31	PROTECT	Protection circuit discrimination input terminal.H when the protection circuit operates.
32	Vcc	Power supply terminal.

Pin No.	Symbol	Description
33	CL	Clock pulse output terminal.Connect to the terminal CL of PLL IC, the terminal CE of analog switches,the terminal SECK of delay IC, the terminal CK of the electro volume,and the terminal SCK of data extended IC.
34	PHONO	Phono control output terminal.L when the selector switch is PHONO.
35	DATA	Data output terminal.Connect to the terminal DATA of PLL IC,the terminal DI of analog switches,the terminal SEDATA of delay IC ,the terminal DATA of electro volume,and the terminal SIN of data extended IC.
36	LAT	Connect to the terminal LAT of the data extended IC.
37	EN	Connect to the terminal EN of the data extended IC.
38	SCK	Connect to the terminal SCK of the on screen display IC.
39	CS	Connect to the terminal CS of the on screen display IC.
40	SOUT	Connect to the terminal SIN of the on screen display IC.
41	VOLR	Connect to the terminal STB of the electro volume IC for rear and simul.
42	VOLC	Connect to the terminal STB of the electro volume IC for center.
43	K0	Key matrix input terminals.Active H.
44	K1	
45	K2	
46	K3	
47	RES	Reset input terminal.Active H.
48	OSC2	Main system clock input terminal.
49	OSC1	Connect to the ceramic oscillator of 4.19MHz.
50	GND	Ground terminal.
51	CL1	Sub clock input terminal.Not used.
52	CL2	
53	TEST	Test terminal.
54	MR OFF	Multi-room remote control ON/OFF control output terminal.Active L.
55	POWER	Power control output terminal.H when the power turns on.
56	Sn	Segment output terminals.Active H.
57	Sm	
58	Sl	
59	Sk	
60	Sj	
61	Si	
62	Sh	
63	Sg	
64	Sf	

## ADJUSTMENT PROCEDURES

### • Preparation

#### 1. Input

FM mono: 1kHz, 75kHz devi., 60dB/μV

FM stereo: 1kHz, 75kHz devi., 60dB/μV

Pilot signal 19kHz 7.5kHz devi.

AM: 400Hz 30% mod.

#### 2. Outputs

Connect the non-inductive type resistors of 8ohms to the main speaker, subroom speaker, center speaker, and rear speaker terminals unless otherwise noted.

#### 3. Standard Knob Position

TAPE MONITOR 1/2 ..... OFF

VOLUME ..... Maximum

BASS/TREBLE/BALANCE/INPUT

BALANCE ..... Center

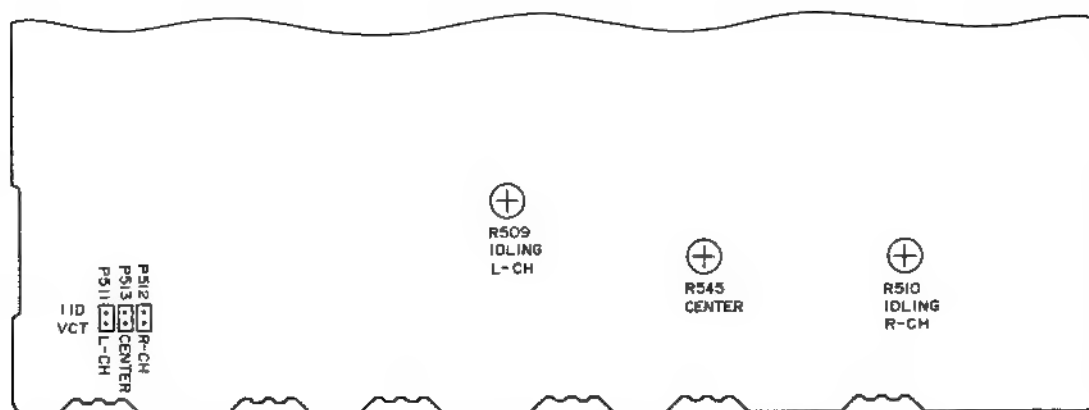
MUTING/LOUDNESS ..... Off

REC SELECTOR ..... SOURCE

INPUT SELECTOR ..... CD

SPEAKERS ..... ON

S.T.C. ..... OFF



PRE., AND MAIN PC BOARD

### Amplifier section

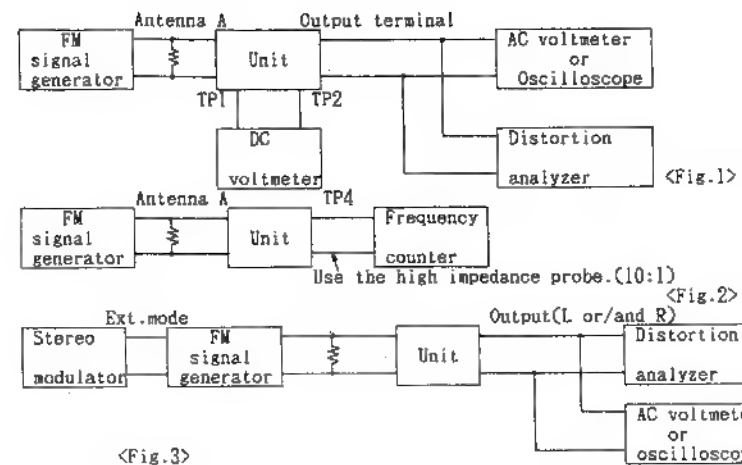
#### Idling Current Adjustment

Connect the DC voltmeter to the terminals IID and VCT on the pre., and main amplifier pc board. Adjust the semi-fixed resistors R509, R510, and R545 so that the indication of voltmeter is  $5 \pm 0.5\text{mV}$ .



# Section

Item	Step	Connection of instrument	FM SG output	Stereo modulator output	Tuning frequency	Output indicator	Adjustment point	Adjust for	Remarks
	1	Fig. 1	99.1MHz 1kHz, 75kHz devi. 65dBf (60dB)		99.1MHz	DC voltmeter	L101	$0 \pm 20\text{mV}$	FM MUTE/MODE switch: ON/STEREO Repeat the steps 1 and 3 until no further adjustment is necessary.
	2					AC voltmeter	IFT on the front end	Maximum	
	3					Distortion analyzer	L102	Minimum	
		Fig. 2	99.1MHz 1kHz, 75kHz devi. 65dBf (60dB)		99.1MHz	Frequency counter	R201	$19\text{kHz} \pm 10\text{Hz}$	
		Fig. 3	99.1MHz, Ext mod., 65dBf (60dB)	Channel L or R 1kHz	99.1MHz	Distortion analyzer	IFT on the front end	Minimum	Don't turn more than $\pm 180^\circ$
	1	Fig. 3	99.1MHz Ext. modulation 65dBf (60dB)	Channel L 1kHz	99.1MHz	Channel R AC voltmeter	R202	Minimum	Maximum and same separation.
	2			Channel R 1kHz		Channel L AC voltmeter		Minimum	
		Fig. 3	99.1MHz 17.2dBf (12dB)		99.1MHz	TUNING indicator	R101	Light on	



# Section

AM SG output	Tuning frequency	Output indicator	Adjustment point	Adjust for
	530kHz	Digital DC voltmeter	OSC coil on RF block	$1.5 \pm 0.1\text{V}$
600kHz 400Hz, 30% mod. 60dB/m	600kHz	AC voltmeter	ANT coil on RF block	Maximum
990kHz 400Hz, 30% mod. 60dB/m	990kHz	AC voltmeter	L152	Maximum

## Reference Specifications

FM tuned voltage: 87.5MHz ~ 108.00MHz

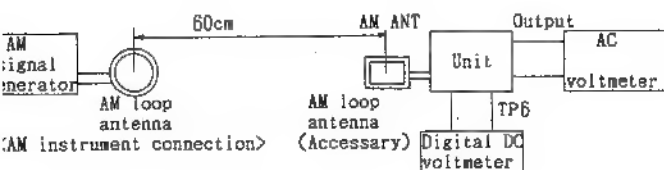
$1.6 \pm 0.4\text{V} \sim 7.9 \pm 0.4\text{V}$

AM tuned voltage: 530kHz  $1.3 \pm 0.5\text{V}$

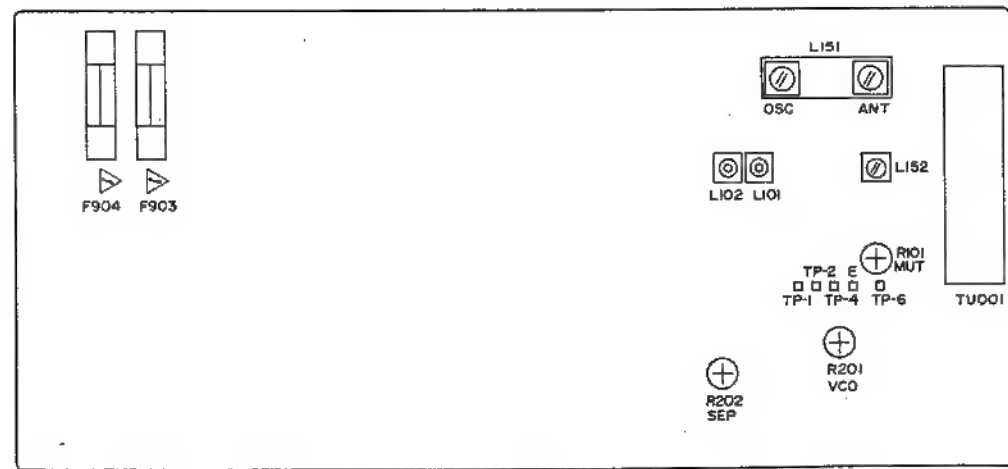
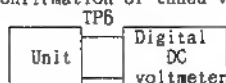
1710kHz  $7.2 \pm 0.5\text{V}$

Auto stop level: AM: Less than 62dB/m

FM: Less than 17dB/μ



## Confirmation of tuned voltage



Tuner circuit pc bo

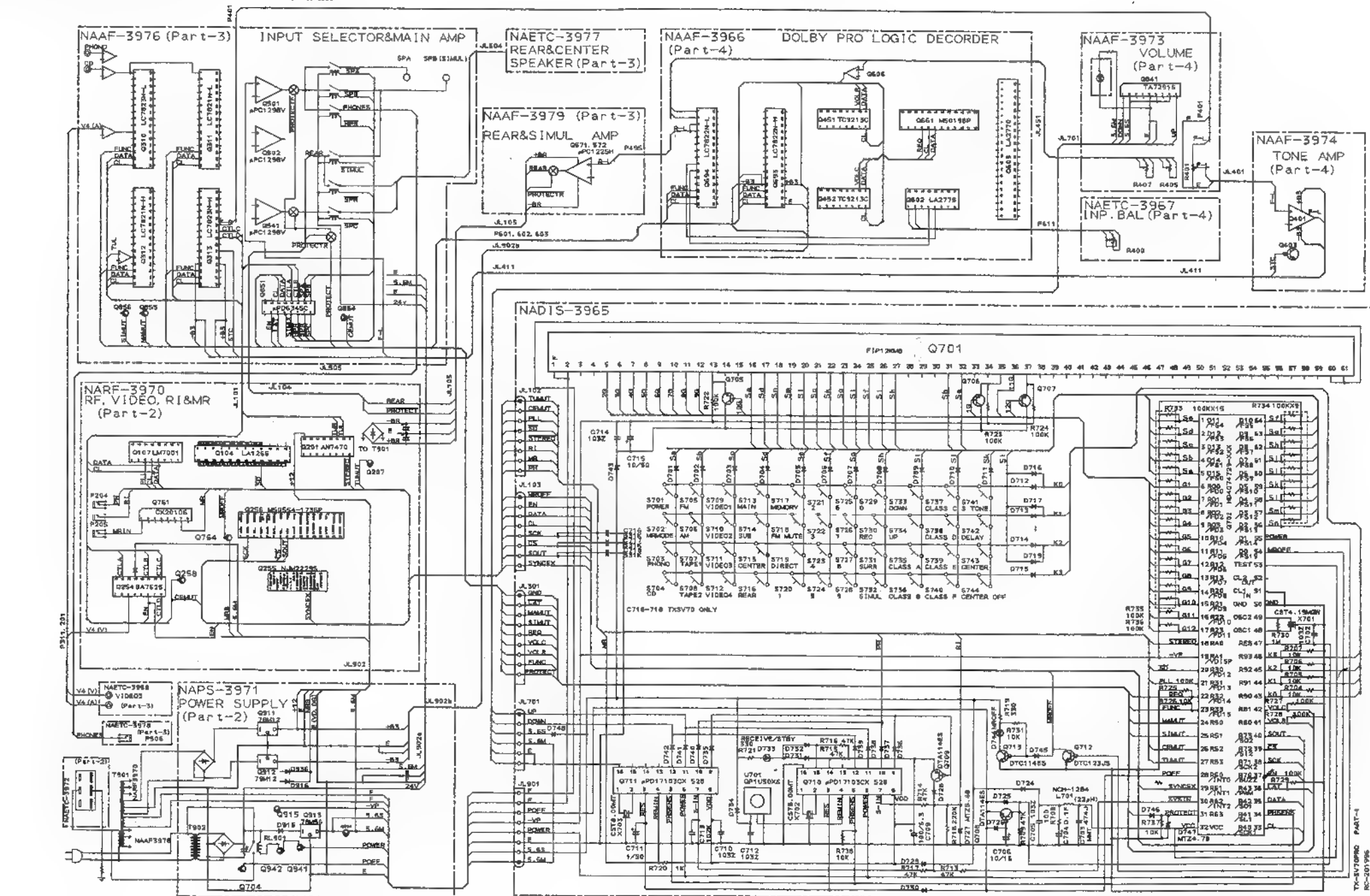
## DISPLAY CIRCUIT PC BOARD (NADIS-3965-1)

## CIRCUIT NO. PART NO. DESCRIPTION

<b>Remocon sensor</b>		
U701	24130003	GPIU50XS
<b>ICs</b>		
Q702	22240378	HD404729A86
Q710, Q711	22240376	$\mu$ PD17103CX-528
<b>FL tube</b>		
Q701	212088	FIP12KM8
<b>Transistors</b>		
Q705-Q707	2213284	2SC1740S-R
Q708, Q709	2213510	DTA114ES
Q712	2213640	DTC123JS
Q713	2213290	DTC114ES
<b>Diodes</b>		
D701-D715	223163	ISS133
D719, D748	223163	ISS133
D724-D726	223163	ISS133
D727	224450562	MTZ5.6B, Zener
D728-D732	223163	ISS133
D734-D743	223163	ISS133
D745, D746	223163	ISS133
D747	224450472	MTZ4.7B, Zener

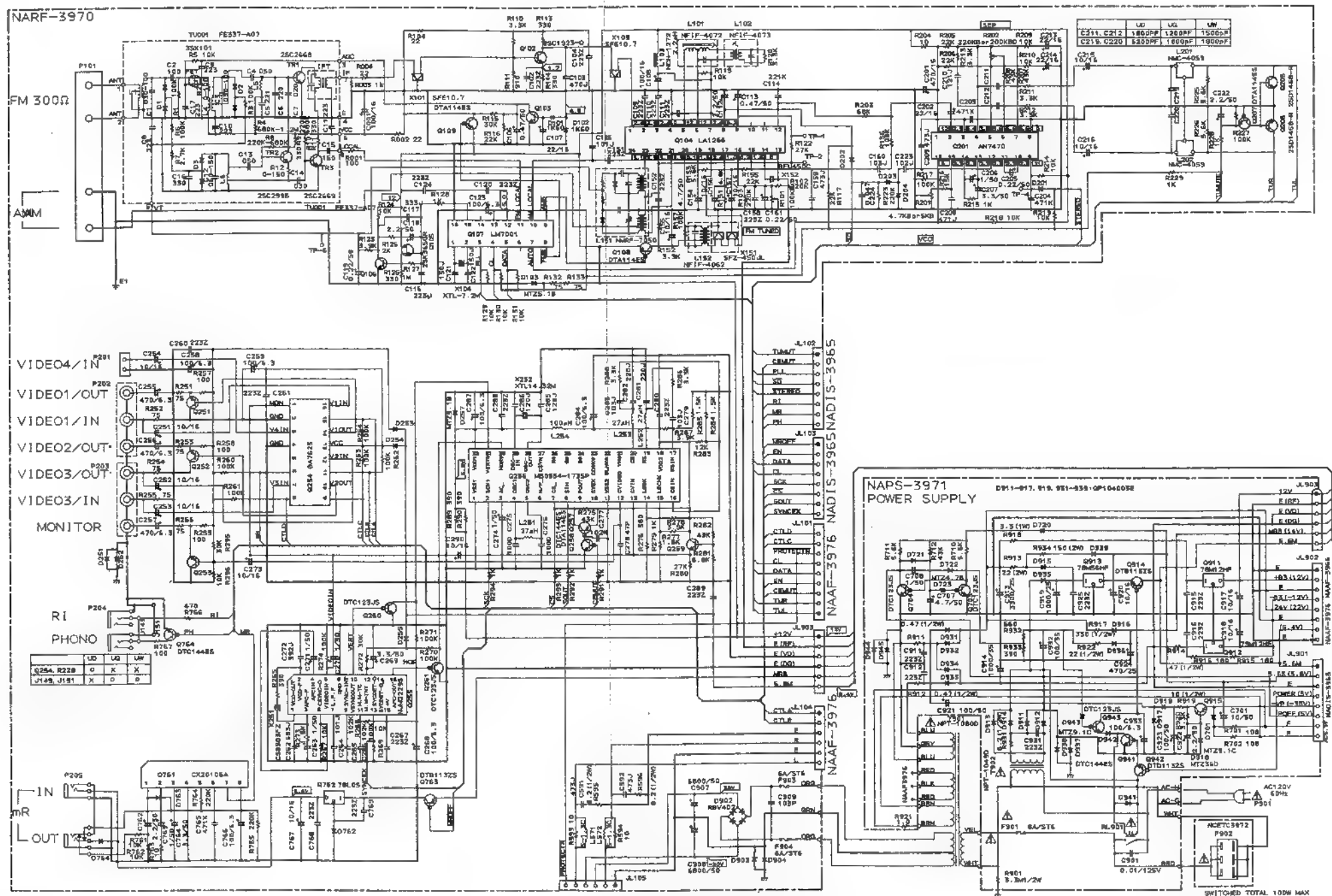
## CIRCUIT NO. PART NO. DESCRIPTION

<b>L.E.Ds</b>		
D733, D744	225141	SEL2213C
<b>Ceramic oscs</b>		
X701	3010163	CST4.19MGW
X702, X703	3010154	CST8.00MT
<b>Coil</b>		
L701	233409K220	NCH-1284
<b>Capacitors</b>		
C703	375524744	0.47 $\mu$ F, 5%, 50V, Plastic (MMT)
C704	3000057	0.1F, 5.5V, Super
C706	353741009	10 $\mu$ F, 16V, Elect.
C709	353721019	100 $\mu$ F, 6.3V, Elect.
C711, C715	353780109	1 $\mu$ F, 50V, Elect.
<b>Resistors</b>		
R733	49163104415	100k $\times$ 15, 1/10W, Network
R734	49163104409	100k $\times$ 9, 1/10W, Network
<b>Switches</b>		
S701-S744	25035548	NPS-111-S510
<b>Holders</b>		
Q701a	27190784	FL tube
D733a	27190549	Stand-by
D744a	27190517A	MR Off



# SCHEMATIC DIAGRAM

## RF CIRCUIT AND POWER SUPPLY SECTION



## TUNER CIRCUIT PC BOARD (NARF-3970-1)

CIRCUIT NO. PART NO. DESCRIPTION

<b>Front End</b>		
TU001	240088	FE337-A07
<b>ICs</b>		
Q104	22240039	LA1266
Q107	22240090	LM7001
Q201	22240242	AN7470
Q254	22240373	BA7625
Q255	22240374	NJM2229S
Q256	22240299	M50554-173SP
Q761	22240345	CX20106A
Q762	222780053	78L05
<b>Transistors</b>		
Q102	2211723	2SC1923-O
Q103, Q106	2211183 or	2SC1740-R or
Q259	2211255	2SC1815-GR
Q105	2212445	2SK365-GR, FET
Q108, Q109	2213510	DTA114ES
Q205, Q206	2212794	2SD1468-R
Q207	2213510	DTA114ES
Q251-Q253	2213074 or	2SA933-R or
	2211455	2SA1015-GR
Q257	2213510	DTA114ES
Q258	221282	DTC144ES
Q260, Q261	2213640	DTC123JS
Q763	2213830	DTB113ZS
Q764	221282	DTC144ES
<b>Diodes</b>		
D101, D102	223132	1K60, Germanium
D103	224450512	MTZ5.1B, Zener
D201-D204	223163	1SS133
D251-D255	223163	1SS133
D257	224450512	MTZ5.1B, Zener
D762-D764	223163	1SS133
D902	22380022	RBV402
D903, D904	223163	1SS133
<b>Transformers</b>		
L101	233401	NFIF-4072
L102	233402	NFIF-4073
L152	232139	NMIF-4062
<b>Coils</b>		
L103	233409M022	NCH-1272
L151	232148	NMRF-7050
L201, L202	233355A	NMC-4059
L251-L253	233409K270	NCH-1285
L254	233409K101	NCH-1292
L571, L572	231176	S-1.3C
<b>Ceramic Filters</b>		
X101, X103	3010071	SFE10.7MA5
X151	3010123	SFZ450JL
X152	3010076	BFU450C
<b>Oscillator elements</b>		
X104	3010141	XTL-7.2M, X'tal
X251	3010168	CSB503F2, Ceramic
X252	3010167	XTL-14.32M, X'tal
<b>Capacitors</b>		
C001, C108	354741019	100 $\mu$ F, 16V, Elect.
C106	354784799	0.47 $\mu$ F, 50V, Elect.

CIRCUIT NO.	PART NO.	DESCRIPTION
C107	354742209	22 $\mu$ F, 16V, Elect.
C112	354780229	2.2 $\mu$ F, 50V, Elect.
C113	354784799	0.47 $\mu$ F, 50V, Elect.
C116	374722234	0.022 $\mu$ F, 5%, 50V, TF
C117	374723334	0.033 $\mu$ F, 5%, 50V, TF
C118	354780229	2.2 $\mu$ F, 50V, Elect.
C119, C161	354782299	0.22 $\mu$ F, 50V, Elect.
C123	354721019	100 $\mu$ F, 6.3V, Elect.
C154	354780479	4.7 $\mu$ F, 50V, Elect.
C155-C157	354741009	10 $\mu$ F, 16V, Elect.
C159	374724734	0.047 $\mu$ F, 5%, 50V, TF
C160	374721034	0.01 $\mu$ F, 5%, 50V, TF
C201	354744719	470 $\mu$ F, 16V, Elect.
C202	354742209	22 $\mu$ F, 16V, Elect.
C205	354782299	0.22 $\mu$ F, 50V, Elect.
C206	354780109	1 $\mu$ F, 50V, Elect.
C207	354780339	3.3 $\mu$ F, 50V, Elect.
C208	370134714	470pF, 5%, 100V, APS
C209	374724734	0.047 $\mu$ F, 5%, 50V, TF
C211, C212	374721824	1800pF, 5%, 50V, TF
C213, C214	354742209	22 $\mu$ F, 16V, Elect.
C215, C216	354741009	10 $\mu$ F, 16V, Elect.
C219, C220	374726224	6200pF, 5%, 50V, TF
C222	354780229	2.2 $\mu$ F, 50V, Elect.
C223	374721024	1000pF, 5%, 50V, TF
C224	374724734	0.047 $\mu$ F, 5%, 50V, TF
C251-C254	354741009	10 $\mu$ F, 16V, Elect.
C255-C257	354724719	470 $\mu$ F, 6.3V, Elect.
C258, C259	354721019	100 $\mu$ F, 6.3V, Elect.
C262	374726834	0.068 $\mu$ F, 5%, 50V, TF
C263	354780109	1 $\mu$ F, 50V, Elect.
C268	354721019	100 $\mu$ F, 6.3V, Elect.
C269	354780339	3.3 $\mu$ F, 50V, Elect.
C270, C271	354780109	1 $\mu$ F, 50V, Elect.
C272	374723924	3900pF, 5%, 50V, TF
C273	354741009	10 $\mu$ F, 16V, Elect.
C274	354780109	1 $\mu$ F, 50V, Elect.
C279, C283	374721034	0.01, 5%, 50V, TF
C284, C287	354721019	100 $\mu$ F, 6.3V, Elect.
C290	354741009	10 $\mu$ F, 16V, Elect.
C591, C592	374724734	0.047 $\mu$ F, 5%, 50V, TF
C762	354780229	2.2 $\mu$ F, 50V, Elect.
C763	354780109	1 $\mu$ F, 50V, Elect.
C764	354780339	3.3 $\mu$ F, 50V, Elect.
C766	354721019	100 $\mu$ F, 6.3V, Elect.
C767	354741009	10 $\mu$ F, 16V, Elect.
C907, C908	3504207	6800 $\mu$ F, 50V, Elect.

**Resistors**

R101	5210221 or 5210070	N06HR100KBD, Semi-fixed
R201	5210216 or 5210062	N06HR5KBD or N06HR4.7KBD, Semi-fixed
R202	5210072 or 5210222	N06HR220KBC or N06HR200KBD, Semi-fixed
R595, R596	442520824	8.2ohm, 1/2W, Metal oxide film

**Terminal**

P101	25060085	NTM-4PDMN29, Antenna
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**Sockets**


P201	2009990021A	NSAS-4P0045
JL101	25050273	NSCT-9P101
JL102, JL103	25050272	NSCT-8P100
JL104, JL105	25050270	NSCT-6P98
JL903	25050270	NSCT-6P98

CIRCUIT NO.	PART NO.	DESCRIPTION
	<b>Jacks</b>	
P202, P203	25045299	NPJ-3PDYE158
P204	25045172	HSJ-1003-01-020, RI
P205	25045293	HSJ-1003-01-012, MR

**Fuses**

F903, F904	252051	 6A (ST-6), Secondary
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**Holders**

F903a, F904a	250113	 SN5051, Fuse
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**POWER SUPPLY CIRCUIT PC BOARD (NAPS-3971-1)**

CIRCUIT NO.	PART NO.	DESCRIPTION
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**ICs**

Q911	222780122	NEC 78M12
Q912	222790125	79M12
Q913	222780565	JRC 78M56


**Transistors**

Q703, Q704	2213640	DTC123JS
Q914	2213830	DTB113ZS
Q915	2213074 or 2211455	2SA933-R or 2SA1015-GR
Q941	221282	DTC144ES
Q942	2213650	DTD113ZS
Q943	2213640	DTC123JS


**Diodes**

D701	224450913	MTZ9.1C, Zener
D720-D722	223163	ISS133
D723	224450472	MTZ4.7B, Zener
D911-D917	22380035 or 22380032	GP104003E or 1SR139-100
D918	224453604	MTZ36D, Zener
D919, D939	22380035 or 22380032	GP104003E or 1SR139-100
D937, D938	223163	ISS133
D941, D942	223163	ISS133
D943	224450913	MTZ9.1C
D944, D945	223163	ISS133


**Power transformer**

T902	2300493	 NPT-1049D
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**Capacitors**

C701	354781009	10 $\mu$ F, 50V, Elect.
C707	354780479	4.7 $\mu$ F, 50V, Elect.
C708	354780109	1 $\mu$ F, 50V, Elect.
C901	3500065A	 DE7150FZ103PAC400V/125V, IS
C913	354753329	3300 $\mu$ F, 25V, Elect.
C914	354761029	1000 $\mu$ F, 35V, Elect.
C917, C918	354741009	10 $\mu$ F, 16V, Elect.
C919	354751029	1000 $\mu$ F, 25V, Elect.
C920	354741009	10 $\mu$ F, 16V, Elect.
C921, C923	354781019	100 $\mu$ F, 50V, Elect.
C922	354780229	2.2 $\mu$ F, 50V, Elect.
C924	354754719	470 $\mu$ F, 25V, Elect.
C932	354781019	100 $\mu$ F, 50V, Elect.
C933	354721019	100 $\mu$ F, 6.3V, Elect.

**Resistors**

R901	431523355	 3.3Mohm, 1/2W, Solid
R911, R912	442524794	0.47ohm, 1/2W, Metal oxide film
R913	441722204	22ohm, 2W, Metal oxide film
R914	442524704	47ohm, 1/2W, Metal oxide film
R917	442523314	330 ohm, 1/2W, Metal oxide film
R918	441620334	3.3 ohm, 1W, Metal oxide film



CIRCUIT NO.	PART NO.	DESCRIPTION
R919	442521004	10ohm, 1/2W, Metal oxide film
R922	442522204	22ohm, 1/2W, Metal oxide film
R931	442520824	8.2 ohm, 1/2W, Metal oxide film
R934	441721514	150ohm, 2W, Metal oxide film

<b>Relay</b>		
RL901	25065248	▲ NRL-1P15A-DC12-29

<b>Sockets</b>		
JL901, JL902	25050272	NSCT-8P100
P903	2009990078	NSAS-4P0115

<b>Fuse</b>		
F901	252053	▲ 8A (ST-6), Primary

<b>Fuseholders</b>		
F901a	250113	▲ SN5051, Fuse

<b>Radiator</b>		
	27160209	RAD-67

CIRCUIT NO.	PART NO.	DESCRIPTION
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<b>Labels</b>		
F901b	29360842	8A/125V, Rating
F901c	29360626-1	Fuse

## AC OUTLET TERMINAL PC BOARD (NAETC-3972-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
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P902	25050388	▲ NSCT-6P215, AC outlet
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NOTE:  
THE COMPONENTS IDENTIFIED BY MARK ▲ ARE  
CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK.  
REPLACE ONLY WITH PART NUMBER SPECIFIED.

# PRINTED CIRCUIT BOARD PARTS LIST

## PRE./MAIN AMPLIFIER PC BOARD (NAAF-3976-1)

### CIRCUIT NO. PART NO. DESCRIPTION

#### ICs

Q301	22240191	NJM4565D-D
Q302-Q309	22240247 or 22240293	BA15218N or NJM4558L-D
Q310, Q313	22240339	LC7823N
Q311, Q312	22240280	LC7821N
Q501, Q502	22240311	$\mu$ PC1298V
Q541	22240311	$\mu$ PC1298V
Q851	22240211	$\mu$ PD6345C

#### Transistors

Q491-Q493	2213631 or 2213632	RN1241-A or RN1241-B
Q503, Q504	2211183 or	2SC1740-R or
Q542	2211255	2SC1815-GR
Q505, Q506	2201653,	$\star$ 2SC3856-O,
Q543	2201654 or 2201655	$\star$ 2SC3856-Y or $\star$ 2SC3856-P
Q507, Q508	2201663,	$\star$ 2SA1492-O,
Q544	2201664 or 2201665	$\star$ 2SA1492-Y or $\star$ 2SA1492-P

CAUTION: Replacement for transistor of mark  $\star$ , if necessary, must be made from the same beta group (HFE) as the original type.

2SC3856-O      2SA1492-O  
└──────────┘  
Same beta group

#### Same beta group

Q531-Q534	2211732 or	2SC1845-F or
Q556	2211733	2SC1845-E
Q561	2211792 or 2211793	2SA992-F or 2SA992-E
Q801-Q805	2213631 or 2213632	RN1241-A or RN1241-B
Q852, Q855, Q856	2213510	DTA114ES
Q853	2213710	DTA123JS
Q854	221282	DTC114ES

#### Diodes

D501-D506	223163	1SS133
D851, D852	223163	1SS133
D901	22380038	RBV602

#### Coils

L501, L502	231176	S-1.3C
L541	231176	S-1.3C

#### Capacitors

C303, C304	391980227	2.2 $\mu$ F, 50V, Elect.
C307, C308	391921017	100 $\mu$ F, 6.3V, Elect.
C309, C310	374726224	6200pF, 5%, 50V, TF
C311, C312	374721824	1800pF, 5%, 50V, TF
C313, C314	391941007	10 $\mu$ F, 16V, Elect.
C317-C320	391941007	10 $\mu$ F, 16V, Elect.
C323-C326	391941007	10 $\mu$ F, 16V, Elect.
C331-C334	391941007	10 $\mu$ F, 16V, Elect.
C339-C342	391941007	10 $\mu$ F, 16V, Elect.
C347-C350	391941007	10 $\mu$ F, 16V, Elect.
C355-C358	391941007	10 $\mu$ F, 16V, Elect.
C361-C364	391941007	10 $\mu$ F, 16V, Elect.
C367-C370	391941007	10 $\mu$ F, 16V, Elect.
C371, C372	354744709	47 $\mu$ F, 16V, Elect.
C501, C502	391941007	10 $\mu$ F, 16V, Elect.
C503, C504	373303314	330pF, 5%, 125V, PP
C505, C506	354742219	220 $\mu$ F, 16V, Elect.
C511, C512	374726834	0.068 $\mu$ F, 5%, 50V, TF

### CIRCUIT NO. PART NO. DESCRIPTION

C513, C514	374724734	0.047 $\mu$ F, 5%, 50V, TF
C517-C520	354700109	1 $\mu$ F, 160V, Elect.
C533	391921017	100 $\mu$ F, 6.3V, Elect.
C541	391941007	10 $\mu$ F, 16V, Elect.
C542	373303314	330pF, 5%, 125V, PP
C543	354742219	220 $\mu$ F, 16V, Elect.
C546	374726834	0.068 $\mu$ F, 5%, 50V, TF
C547	374724734	0.047 $\mu$ F, 5%, 50V, TF
C549, C550	354700109	1 $\mu$ F, 160V, Elect.
C562	354700109	1 $\mu$ F, 160V, Elect.
C851	391921017	100 $\mu$ F, 6.3V, Elect.
C855, C856	391941007	10 $\mu$ F, 16V, Elect.
C905, C906	3504240	12000 $\mu$ F, 63V, Elect.

#### Resistors

R509, R510	5210118 or	N06HR 5KBC or
R545	5210062	N06HR 4.7KBD, Semi-fixed
R515-R516	442520824	8.2ohm, 1/2 W, Metal oxide film
R517, R518	441620824	8.2ohm, 1W, Metal oxide film
R519, R520	4500031	0.22ohm, 5W, Metal plate
R521, R522	442520824	8.2ohm, 1/2W, Metal oxide film
R523, R524	441620474	4.7ohm, 1W, Metal oxide film
R525-R528	442524794	0.47ohm, 1/2W, Metal oxide film
R529, R530	441623914	390ohm, 1W, Metal oxide film
R548	442520824	8.2ohm, 1/2W, Metal oxide film
R549	441620824	8.2ohm, 1W, Metal oxide film
R550	4500031	0.22ohm, 5W, Metal plate
R551	442520824	8.2ohm, 1/2W, Metal oxide film
R552	441620474	4.7ohm, 1W, Metal oxide film
R553, R554	442524794	0.47ohm, 1/2W, Metal oxide film

#### Relays

RL501, RL502	25065339	NRL-2P5A-DC24-046
RL503	25065379	NRL-1P5A-DC24-058
RL504, RL505	25065339	NRL-2P5A-DC24-046
RL506	25065396	NRL-2P1.25A-DC24-067

#### Terminals

P301-P303	25045300	NPJ-6PDBL-159
P304	25045301	NPJ-8PDBL-160
P305	25045298	NPJ-2PDBL-157
P501	25060125	NTM-8PDMN058

#### Plugs

P511-P513	25055493	NPLG-2P468
P601-P603	25055492	NPLG-9P467

#### Sockets

P311	2000783	NSAS-6P739
P401	2000931	NSAS-6P884
JL301	25050273	NSCT-9P101
JL411	25050270	NSCT-6P98

#### Shield plate

27150309

#### Radiators

27160262

#### Clamps

27301186

#### Cord ass'y

P491	2065525300
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**HEADPHONE TERMINAL PC BOARD (NAETC-3978-1)****CIRCUIT NO. PART NO. DESCRIPTION**

P504 25045256 YKB21-5010, Headphone terminal

**VIDEO TERMINAL PC BOARD (NAETC-3968-1)****CIRCUIT NO. PART NO. DESCRIPTION**

D381-D384 223163 1SS133, Diodes  
 P307 25045321 NPJ-3PDBL178, Terminal  
 P201a 25055132 NPLG-2P116, Plug  
 P311a 25055133 NPLG-3P117, Plug  
 P999 2061712100 Cord ass'y

**HEAR AMPLIFIER PC BOARD (NAAF-3979-1)****CIRCUIT NO. PART NO. DESCRIPTION**

**ICs**  
 Q571, Q572 22240108  $\mu$ PC1225H

**Transistors**  
 Q573, Q574 2211183 or 2SC1740-R or  
 2211255 2SC1815-GR  
 Q575, Q576 2202063,  $\star$ 2SC4511-O,  
 2202064 or  $\star$ 2SC4511-Y or  
 2202066  $\star$ 2SC4511-P  
 Q577, Q578 2202053,  $\star$ 2SA1725-O,  
 2202054 or  $\star$ 2SA1725-Y or  
 2202056  $\star$ 2SA1725-P

**CAUTION:** Replacement for transistor of mark  $\star$ , if necessary must be made from the same beta group (HFE) as the original type.

**CIRCUIT NO. PART NO. DESCRIPTION**

Ex. 2SC4511-O 2SA1725-O

Same beta group

Q579, Q580 2211732 or 2SC1845-F or  
 2211733 2SC1845-E

**Capacitors**

C571, C572 391980227 2.2 $\mu$ F, 50V, Elect.  
 C575, C576 354741019 100 $\mu$ F, 16V, Elect.  
 C583, C584 374723334 0.033 $\mu$ F, 5%, 50V, TF  
 C585, C586 391980227 2.2 $\mu$ F, 50V, Elect.

**Resistors**

R589, R590 4500027 0.22ohm, 2W, Metal plate  
 R592 442520824 8.2ohm, 1/2W, Metal oxide film

**Socket**

P495 2000562 NSAS-6P518

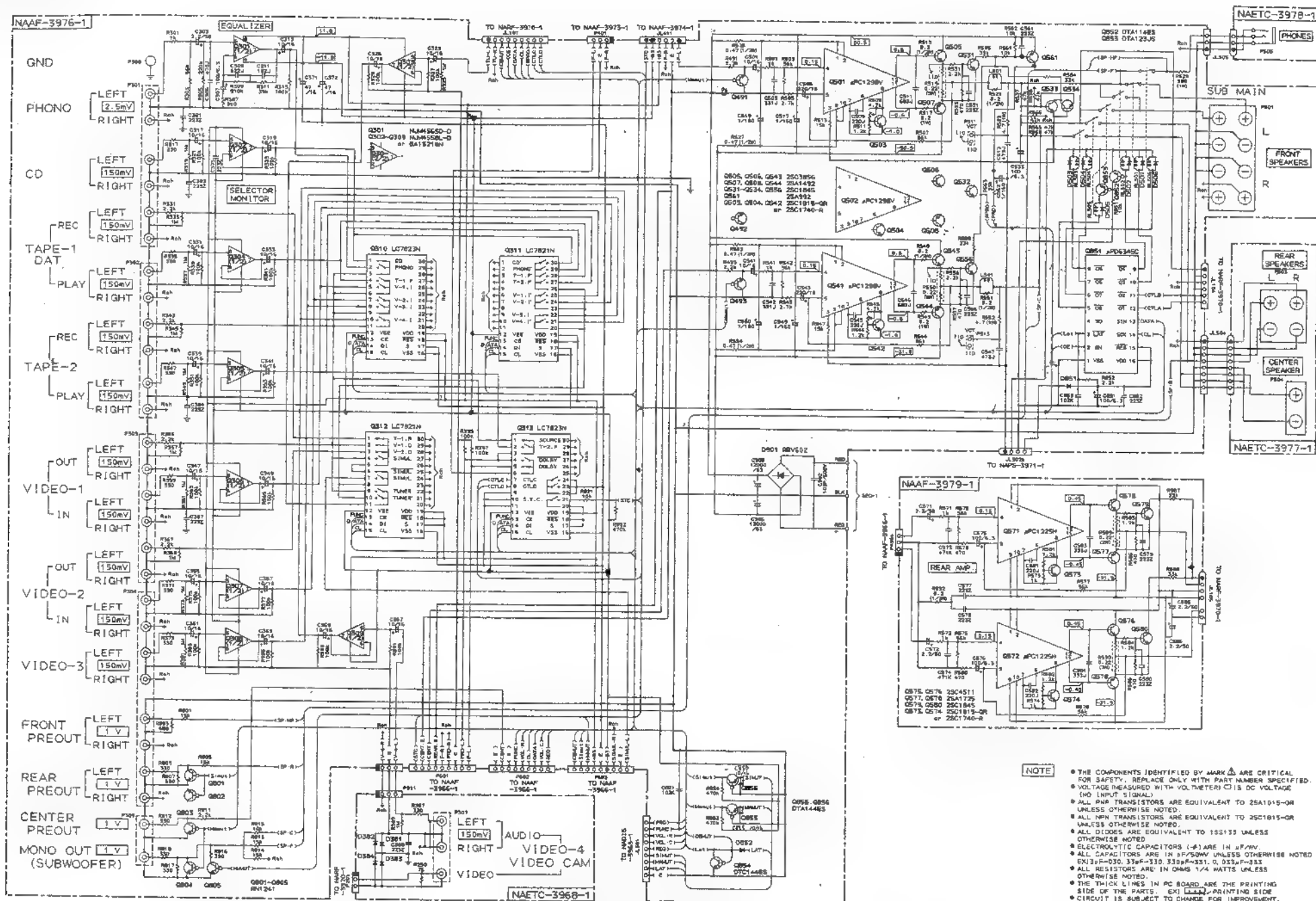
**SPEAKER TERMINAL PC BOARD (NAETC-3977-1)****CIRCUIT NO. PART NO. DESCRIPTION**

P502 25060143 NTM-2PDML071, Terminal  
 Center Speaker

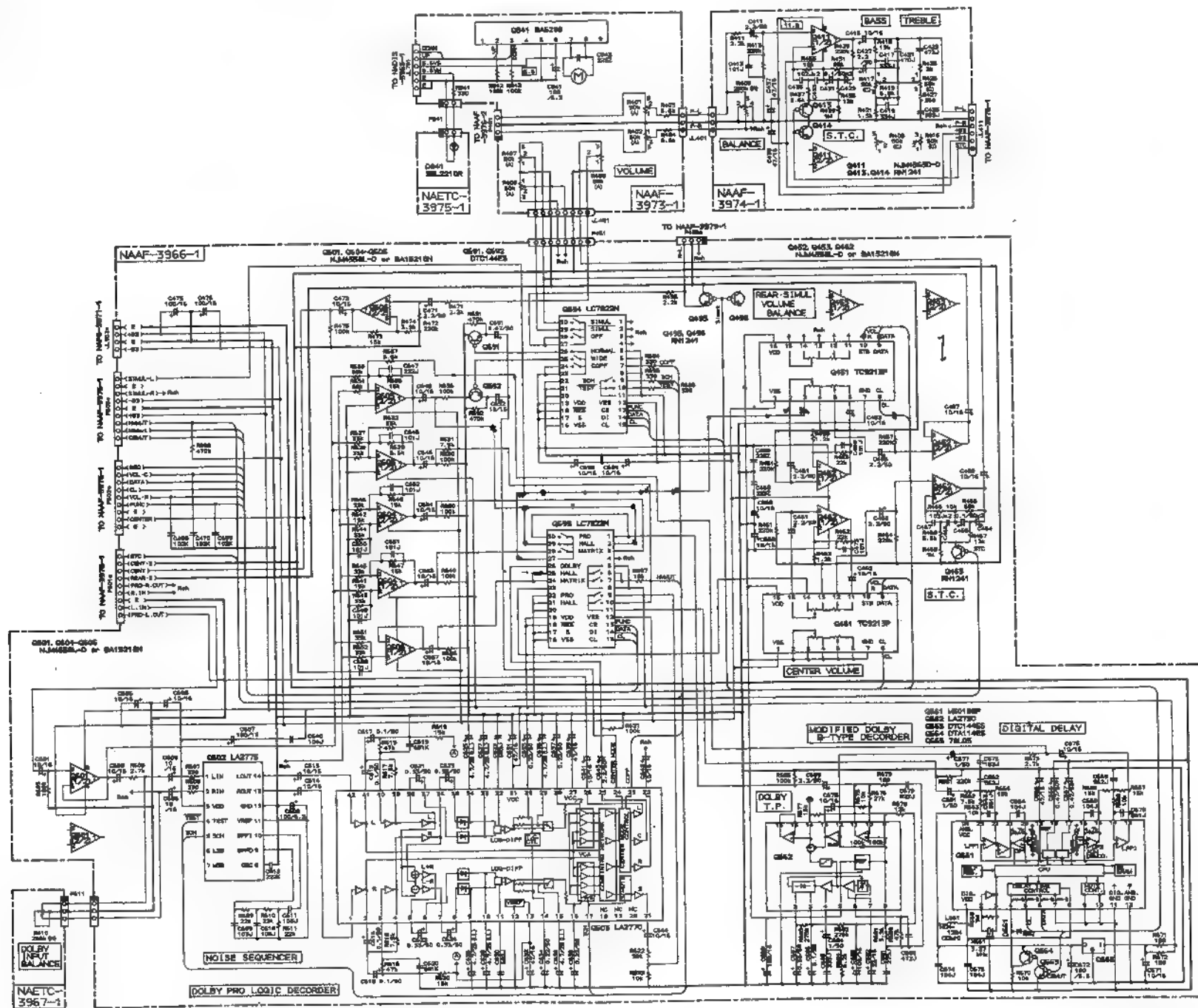
P503 25060144 NTM-4PDML072, Terminal  
 Rear Speaker

# SCHEMATIC DIAGRAM

## AMPLIFIER SECTION



### SCHEMATIC DIAGRAM CONTROL SECTION



# **SURROUND CIRCUIT PC BOARD (NAAF-3966-1)**

## **CIRCUIT NO. PART NO. DESCRIPTION**

<b>ICs</b>		
Q451, Q461	22240266	TC9213P
Q452, Q453	22240247 or	BA15218N or
Q462, Q601	22240293	NJM4558L-D
Q602	22240371	LA2775
Q603	22240279	LA2770
Q604-Q606	22240247 or	BA15218N or
	22240293	NJM4558L-D
Q661	22240370	M50198P
Q662	22240139	LA2730
Q665	222780053	78L05
Q693, Q694	22240270	LC7822N

<b>Transistors</b>		
Q463, Q495	2213631 or	RN1241-A or
Q496	2213632	RN1241-B
Q663	221282	DTC144ES
Q664	2213510	DTA114ES
Q691, Q692	221282	DTC144ES

<b>Diode</b>		
D661	223163	1SS133

<b>Coil</b>		
L661	233409K220	NCH-1284

<b>Ceramic osc</b>		
X661	3010169	CST3.27MGW002

## **CIRCUIT NO. PART NO. DESCRIPTION**

<b>Capacitors</b>		
C451, C452	391980227	2.2 $\mu$ F, 50V, Elect.
C453, C454	391941007	10 $\mu$ F, 16V, Elect.
C455, C456	391980227	2.2 $\mu$ F, 50V, Elect.
C457, C458	391941007	10 $\mu$ F, 16V, Elect.
C461, C463	391980227	2.2 $\mu$ F, 50V, Elect.
C462	391941007	10 $\mu$ F, 16V, Elect.
C464, C465	354781099	0.1 $\mu$ F, 50V, Elect.
C466, C467	374721024	1000pF, 5%, 50V, TF
C468, C472	391941007	10 $\mu$ F, 16V, Elect.
C471	391980227	2.2 $\mu$ F, 50V, Elect.
C475, C476	354741019	100 $\mu$ F, 16V, Elect.
C601-C606	391941007	10 $\mu$ F, 16V, Elect.
C607	354741019	100 $\mu$ F, 16V, Elect.
C608	354721019	100 $\mu$ F, 6.3V, Elect.
C609-C611	374721034	0.01 $\mu$ F, 5%, 50V, TF
C613, C614	391941007	10 $\mu$ F, 16V, Elect.
C615-C618	354781099	0.1 $\mu$ F, 50V, Elect.
C621-C624	354783399	0.33 $\mu$ F, 50V, Elect.
C625-C628	392850477	4.7 $\mu$ F, 25V, LL
C629, C630	374726824	6800pF, 5%, 50V, TF
C631, C632	354744709	47 $\mu$ F, 16V, Elect.
C633, C634	354782299	0.22 $\mu$ F, 50V, Elect.
C635, C636	392850477	4.7 $\mu$ F, 25V, LL
C637, C638	354782299	0.22 $\mu$ F, 50V, Elect.
C639	354744709	47 $\mu$ F, 16V, Elect.
C640	374721044	0.1 $\mu$ F, 5%, 50V, TF
C641, C642	391941007	10 $\mu$ F, 16V, Elect.
C643	391980227	2.2 $\mu$ F, 50V, Elect.



CIRCUIT NO.	PART NO.	DESCRIPTION
C644, C646	391941007	10 $\mu$ F, 16V, Elect.
C647	374722224	2200pF, 5%, 50V, TF
C648	391941007	10 $\mu$ F, 16V, Elect.
C653, C654	391941007	10 $\mu$ F, 16V, Elect.
C657	391941007	10 $\mu$ F, 16V, Elect.
C659, C660	391941007	10 $\mu$ F, 16V, Elect.
C661	354780109	1 $\mu$ F, 50V, Elect.
C662	374725624	5600pF, 5%, 50V, TF
C664, C668	374721044	0.1 $\mu$ F, 5%, 50V, TF
C665	354744709	47 $\mu$ F, 16V, Elect.
C666, C667	354784799	0.47 $\mu$ F, 50V, Elect.
C669	374725624	5600pF, 5%, 50V, TF
C671	391941007	10 $\mu$ F, 16V, Elect.
C672	391921017	100 $\mu$ F, 6.3V, Elect.
C673, C674	374721044	0.1 $\mu$ F, 5%, 50V, TF
C675	391941007	10 $\mu$ F, 16V, Elect.
C676	374721034	0.01 $\mu$ F, 5%, 50V, TF
C677	354780109	1 $\mu$ F, 50V, Elect.
C678	391941007	10 $\mu$ F, 16V, Elect.
C679	374728224	8200pF, 5%, 50V, TF
C680	374724724	4700pF, 5%, 50V, TF
C681	374722734	0.027 $\mu$ F, 5%, 50V, TF
C682	354742209	22 $\mu$ F, 16V, Elect.
C683	354741019	100 $\mu$ F, 16V, Elect.
C684	354780109	1 $\mu$ F, 50V, Elect.
C685	374723334	0.033 $\mu$ F, 5%, 50V, TF
C686	354781099	0.1 $\mu$ F, 50V, Elect.
C687	354783399	0.33 $\mu$ F, 50V, Elect.
C688	354741019	100 $\mu$ F, 16V, Elect.

CIRCUIT NO.	PART NO.	DESCRIPTION
C689	391980227	2.2 $\mu$ F, 50V, Elect.
C691	354784799	0.47 $\mu$ F, 50V, Elect.
C692-C696	391941007	10 $\mu$ F, 16V, Elect.

**Plug**

P495a	25055133	NPLG-3P117
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**Sockets**

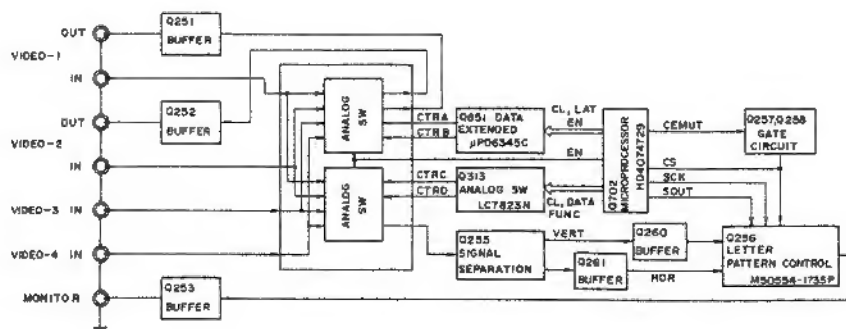
P601a-P603a	25050442	NSCT-9P266
P611	2000799	NSAS-6P755

**Shield wire**

P451	2050031	NCS-8P3E40
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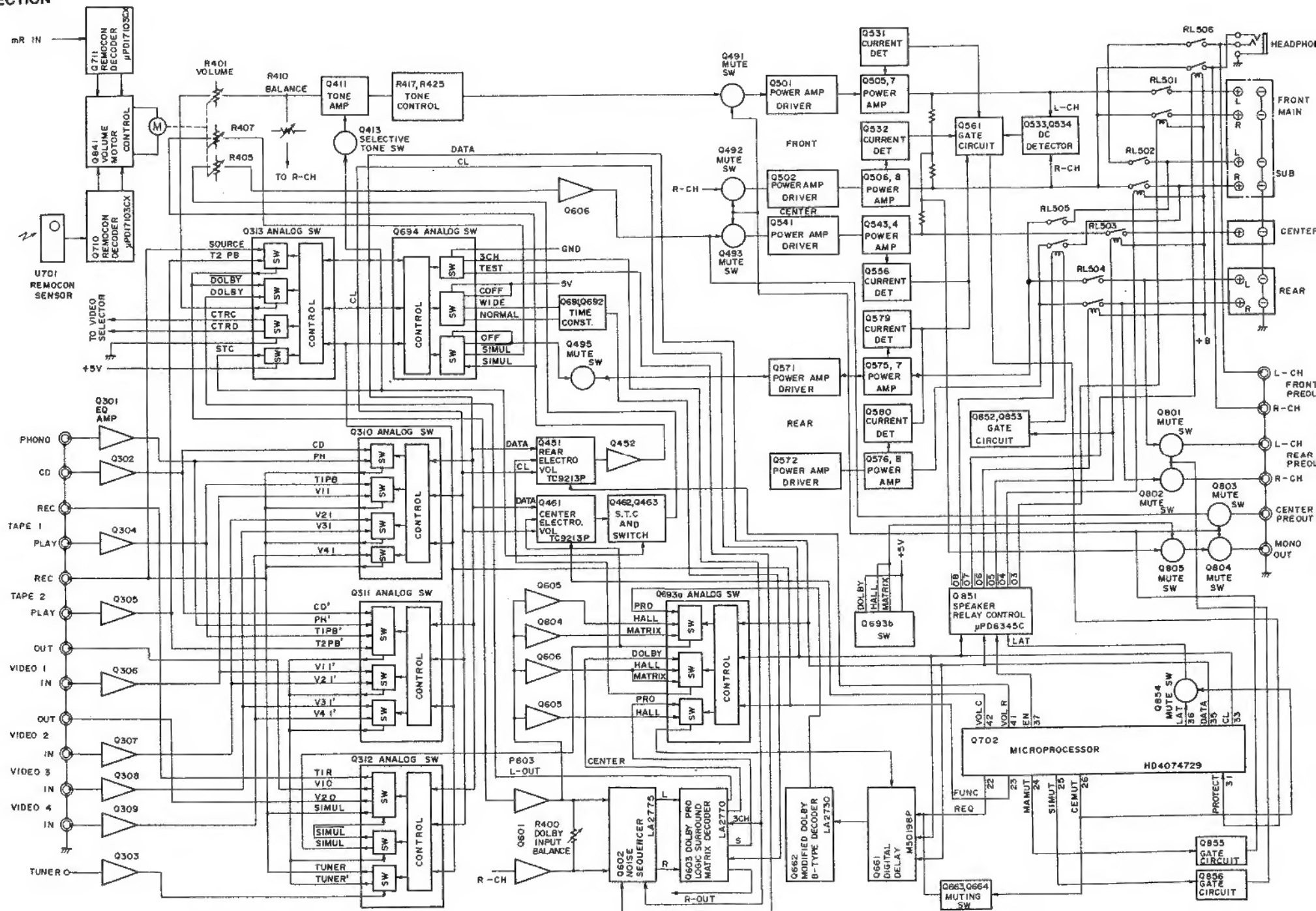
**MASTER VOLUME PC BOARD (NAAF-3973-1)**

CIRCUIT NO.	PART NO.	DESCRIPTION
<b>IC</b>		
Q841	22240372	BA6208
<b>Capacitor</b>		
C841	354721019	100 $\mu$ F, 6.3V, Elect.
<b>Resistor</b>		
R401, R402	5140002	N16RGL50KA30F, Variable,
R407-R409		Master Volume



# CK DIAGRAM

## IFIER SECTION



CIRCUIT NO.	PART NO.	DESCRIPTION
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	<b>Plug</b>	
P401a	25055133	NPLG-3P117

	<b>Sockets</b>	
JL451	25050272	NSCT-8P100
JL701	25050269	NSCT-5P97
P841	2000635A	NSAS-4P591

**VOLUME INDICATOR PC BOARD (NADIS-3975-1)**

CIRCUIT NO.	PART NO.	DESCRIPTION
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D841	225241 or 225242 27190545	SEL2210R-C or SEL2210R-D, L.E.D Holder, LED
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**TONE CONTROL CIRCUIT PC BOARD (NAAF-3974-1)**

CIRCUIT NO.	PART NO.	DESCRIPTION
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	<b>IC</b>	
Q411	22240191	NJM4565D-D

	<b>Transistors</b>	
Q413, Q414	2213631 or 2213632	RN1241-A or RN1241-B

	<b>Capacitors</b>	
C411, C412	391980227	2.2 $\mu$ F, 50V, Elect.
C415, C416	391941007	10 $\mu$ F, 16V, Elect.
C417, C418	374723334	0.033 $\mu$ F, 5%, 50V, TF
C419, C420	374723344	0.33 $\mu$ F, 5%, 50V, TF
C423, C424	374724724	4700pF, 5%, 50V, TF
C425, C426	374723934	0.039 $\mu$ F, 5%, 50V, TF
C427, C428	391980227	2.2 $\mu$ F, 50V, Elect.
C429-C432	354781099	0.1 $\mu$ F, 50V, Elect.
C433-C436	374721024	1000pF, 5%, 50V, TF
C437, C438	354744709	47 $\mu$ F, 16V, Elect.

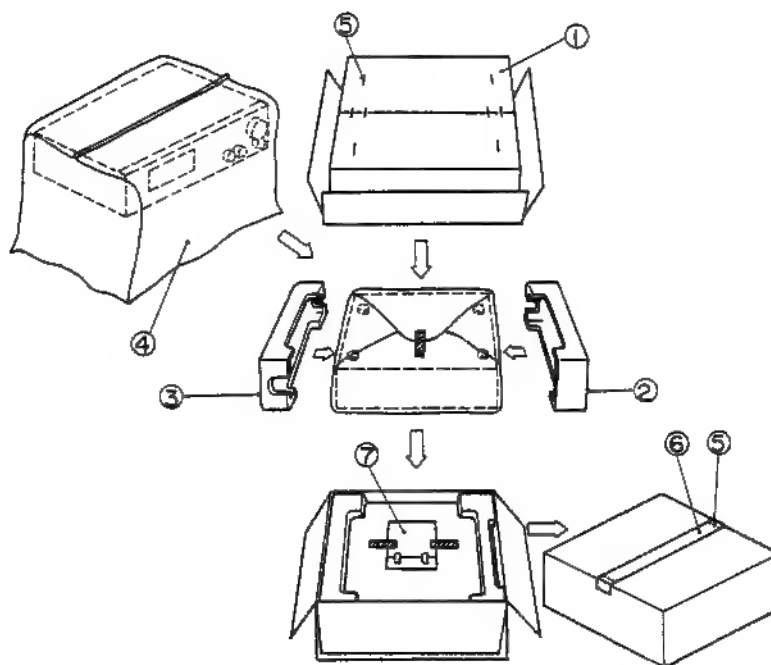
	<b>Resistors</b>	
R405	5104225	N11RGLC250KWT22Z, Variable, BALANCE
R417, R418	5104216	N14RLC50KC22Z, Variable, BASS
R425, R426	5104216	N14RLC50KC22Z, Variable, TREBLE

**INPUT BALANCE VOLUME PC BOARD (NAETC-3967-1)**

CIRCUIT NO.	PART NO.	DESCRIPTION
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R410	5104258	N11RGLC250KWT15Z, Variable resistor
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# PACKING VIEW



REF.NO.	PART NO.	DESCRIPTION
1	29052103	Master carton box
2	29091422A	Pad L
3	29091423A	Pad R
4	29100035A	1020×720, Poly-styrene bag
5	282301	Sealing hook
6	29110071-1	Daplon tape
7	Accessory bag ass'y	
	29341554A	Instruction manual
	29100097	250×350, Poly-styrene bag
	292064B	FM antenna
	232140	NMA-3057, AM loop antenna
	3010054	UM-3, Two batteries
	24140185	RC-AV70M, Remote control transmitter
	2010200	Remote control cord
	29365019	Warranty card
	29358002J	Service station list

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